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Management of Complex Palatoradicular Groove Associated with Endo – Perio Lesion: A Case Report

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ABSTRACT

Background: Palatoradicular groove is a developmental malformation of root of tooth which mainly occurs on palatal aspects of maxillary lateral incisors. This provide open communication of external environment to pulp canal which leads to bacterial entry into canal, that end up at pulpal/periapical infection and mobility.

Aim: This case report describes the management of complex palatoradicular groove associated with endo-perio lesion on maxillary lateral incisor.

Case summary: This report presents the case of 34-year-old female visited to the Department of conservative dentistry and endodontic in PGIDS Rohtak with chief complaint of pain and swelling of gingiva in upper left front region of jaws from 1 month. After radiographic examination it is diagnosed as palatoradicular groove. Management include nonsurgical endodontic treatment and surgical treatment.

Results: Complete healing of lesion was achieved and during a follow up of 1 year good prognosis was achieved.

Keywords: Palato-radicular groove, Biodentine, Bone regeneration treatment etc.

INTRODUCTION

Palato-radicular groove (PRG) is defined as an anatomic anomaly characterized by the presence of a developmental groove that begins in the central fossa of the maxillary incisors, extends over the cingulum, and continues apically to varying depths and distances of the root surface.[(1)] There are various terminology is being used for defining this malformation are palatal or palate-gingival groove, developmental radicular anomaly, distolingual groove, radicular lingual groove and cingulo-radicular groove.

The etiology of PRG is controversial where few of hypothesis suggest that it represents an (1) infolding of enamel organ and hertwig's epithelial root sheath, (2) analogous to the pathogenesis of dens invaginatus, (3) alteration of genetic mechanism and (4) additional hypogenetic root formation.[(2)]

PRG is relatively one of the very rare dental anomaly. The prevalence rate of palate-radicular groove has been reported to be 2.8%-8.5% with a predisposition for Chinese population.[(3)] PRG usually occurs on the palatal side of the maxillary incisors that do not have dental caries or trauma.[(4)] Everett et al.[(5)] reported a prevalence of PRG on 2.8% of lateral incisors whereas Withers et al.[(6)] observed a PRG on 2.3% of maxillary incisors (4.4% of maxillary laterals and 0.28% of maxillary centrals).

Micro-computed tomography (CT) and cone-beam CT have been widely used to observe lateral incisors with PRG. Gu[(7)] classified PRG into three types according to the depth and length of the radicular groove. Type I PRG has a short groove with limited length to the coronal third of the root. Type II PRG has a long groove, and its length is beyond the coronal third of the root, while its depth is often shallow. This implies that the root canal system of the tooth with a type II PRG is often simple. Type III PRG has a long and deep groove, which indicates a complex root canal system.

PRG is closely related with the periodontal tissues where it provides the pathway for bacteria to ingress into the periodontal ligament area and subsequently leads to inflammation. Once the inflammation reaches to ligamental area and disrupts the attachment of periodontal ligament, ends up at formation of self-sustaining localized periodontal pocket at entire length of the groove.[(8)] The management of this malformation is done by utilizing Multidisciplinary

approach including endodontic, periodontic and prosthodontic treatment. This study reports a patient with a type II PRG that was treated by using this multidisciplinary approach.

CASE PRESENTATION

Chief complaint:
A 34-year-old female visited to the Department of conservative dentistry and endodontic in PGIDS Rohtak with chief complaint of pain and swelling of gingiva in upper left front region of jaws from 1 month.

History of past illness:
Patient experienced no pain or trauma in this region during the last 10 years.

Personal and family history:
There was no significant personal or family history.

Physical examination:
On examination, tooth 22 had an intact crown without defect or fracture, but it did not respond to electric pulp testing. There was a swelling on the buccal gingival surface close to tooth 22

Clinical examination:
Clinical examination revealed presence of localized circumscribed gingival swelling on buccal aspect of 22 (i.e., maxillary left lateral incisor) with pocket probing depth of 13 mm from the labial aspect of the involved tooth.

Radiographic findings:
Intraoral periapical radiograph of the tooth showed a obturated tooth with periapical radiolucency at the apex of tooth. Cone-beam computed tomography (CBCT) revealed extension of groove up to the apical third of root with lingual bone loss at the middle third of root.

Treatment:
For the management of the case, non-surgical retreatment was done initially. Gutta percha was removed from the canal with the h file under copious irrigation. Tooth was dried and calcium hydroxide was given for 2 weeks.
During 2nd visit , calcium hydroxide was removed and canal was filled with obturating material

One month after completion of endodontic therapy, sealing of PRG with Biodentine® and Amniotic membrane was planned. Prior to surgery, mouth rinse with 0.2% chlorohexidine gluconate for one minute was advised to the patient. Adequate anaesthesia was achieved with local infiltration of 2% lidocaine with adrenaline in 1 : 200,000 concentration. Full thickness envelope flap was raised on palatal aspect . Complete debridement was done with removal of granulation tissue. The PRG was smoothened with diamond bur under copious sterile saline irrigation. Conditioning of root was done with 17 % ethylenediaminetetraacetic acid (EDTA) for two minutes and removed with sufficient amount of sterile saline solution. Then, the PRG was sealed with Biodentine® . and amniotic membrane was placed above the root surface Finally, flap was approximated with 5-0 silk suture (ETHILON®, Ethicon Inc., Johnson & Johnson, Piscataway, NJ, USA) using simple interrupted suturing technique.

The patient was re-examined at 6 wk, 3 mo, and 1 year after surgery. The healing was uneventful. At 1 year, there was a reduction in the pocket depth from 13 mm to 3 mm without bleeding and tooth is completely symptomless with complete resolution of swelling and pain.

DISCUSSION

The palatoradicular groove acts like a plaque retentive areas which causes accumulation of plaque and providing a definite focus of bacteria to adhere, colonize and gain access to the healthy dental pulp and infect them by using communication channel between external environment to periodontium and then pulp canal. Lee *et al*.[9] formulated the term ‘groove’ which was not used in dental literature until then, while presenting a case report concerning palatal grooves in maxillary laterals. These hidden periodontal grooves and accumulation of supra and subgingival plaques can predispose to infect the pulp in a retrograde manner and result in necrosis of pulp and establishment of communication between pulp chamber (endodontics) and periodontium (periodontal) lesions through accessory canals.[10] There were several challenges in treating PRG which ultimately makes its diagnosis more complex where sometimes endo-perio treatment attempts may failed because the groove can be exclusively periodontal or if not treatment is useless until etiological factors will not be removed. The diagnosis might further be intricate as the clinical picture might suggest a periodontal abscess and radiographically the palatoradicular groove might appear like a vertical root fracture or an extra root canal. After an examination of 3,168 extracted incisors, Kogon reported the prevalence of the palatogingival groove to be 3.4% in central incisors and 5.6% in lateral incisors. In the present case, it was present starting from the cingulum till the apical third of the root.[11]

various materials have been used for sealing grooves, such as composite resin, glass ionomer cement, mineral trioxide aggregate, Biodentine and iRoot BP plus. Glass ionomer cement has been widely used since last one decade, having a properties like an antibacterial effect, chemical bonding ability, fluoride release effect, and ability to attach to epithelial tissue.[12]

Among them, in terms of biocompatibility Mineral trioxide aggregates showed better results in addition, it exhibits lower microleakage when applied to seal the root canal and the periapical tissues. Whereas, the mean setting time of mineral trioxide aggregate is 165.5 min. which makes mineral trioxide aggregate unstable and may be washed away during setting.[13]
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etting time of Biodentine is very less than MTA which is 10.1 minutes that minimizes the risk of getting contact with fluid and get washed away. Furthermore biodentine sealing ability, adaptation and compressive strength is comparable to MTA[14] and also solubility of Biodentine is less than MTA which makes biodentine more resistant to get dissolved in presence of fluid contact.[15] In a study by Zhou *et al*.,[16] it was concluded that Biodentine caused gingival fibroblast reaction similar to that by MTA and can be safely used in procedures requiring close approximation with the periodontal tissues.

Considering the periodontal approach of the associated intra-bony defect, the selection of the regenerative biologic principle (or material) to use with the soft tissue surgical approach depend on the morphology of the intra- bony defect (width, depth, and number of residual bony walls) and on the amount (and quality) of the soft tissues available to cover it. As a general rule, deep and wide defects with only one residual bony wall require a mechanical stabilizer of the blood coagulum (membrane and/or bone filler), whereas in defects with lower defect angles and a greater number of bony walls, biologic mediators of the healing process (e.g. enamel matrix derivates) are indicated.[17] there were various platelet rich membranes available which can be used over sealed groove for production of growth factors which contribute bone regeneration, pdl fibre reattachment and further more subsequent healing of lesion. In present case report, after sealing the groove with biodentine amniotic membrane was used because of its excellent physiological seal with the host tissues, thereby precluding the bacterial contamination. Studies have suggested the usage of amniotic membranes not only because of its structural and anatomic configuration, but also due to its healing enhancement properties by providing a rich source of stem cells and reduced postoperative scarring.[18]

A multiple treatment approach was used for treatment which includes endodontic management of periapical lesion and periodontal approach where surgical treatment was done to expose radicular groove followed by odontoplasty and sealing the groove with biodentine. eliminating the predisposing factors by removal of microbial irritants and then sealing the various routes of communication between the external environment and the periodontal tissues begins the healing process, which initiates the bone deposition into the defect and reattachment of newly generated periodontal fibres to the surface of biodentine by utilizing its bioinductive effects.

CONCLUSION

The palatoradicular groove is a rare but when present can act as a channel for transmitting microbial infection from outside to pulp canal, which should be evaluated and treated accordingly. The groove can lead to focal loss of periodontal attachment which may extend to root apex and result in hopeless prognosis of tooth retention The prognosis of a tooth with a palato-radicular groove (PRG) is unfavourable. The treatment of combined periodontal-endodontic lesions requires multidisciplinary management to control the progression of bone defects.

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